510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY AND INSTRUMENT COMBINATION TEMPLATE

A. 510(k) Number:

k060825

B. Purpose for Submission:

New device

C. Measurand:

human Chorionic Gonadotropin (hCG)

D. Type of Test:

Qualitative, lateral flow immunoassay, Over-the-Counter (OTC)

E. Applicant:

Mizuho USA, Inc.

F. Proprietary and Established Names:

Multi-Use Electronic Pregnancy Test

G. Regulatory Information:

1. Regulation section:
   21 CFR section 862.1155 Human chorionic gonadotropin test system
2. Classification:
   Class II
3. Product code:
   LCX
4. Panel:
   Chemistry (75)

H. Intended Use:

1. Intended use(s):

   See Indications for use.

2. Indication(s) for use:

   Multi-Use Electronic Pregnancy Test is an in vitro diagnostic test for the qualitative determination of human chorionic gonadotropin (hCG) in urine, for the early detection of pregnancy.

   The test will be marketed for the retail or over-the-counter (OTC) use.

3. Special conditions for use statement(s):

   Over-the-counter use

4. Special instrument requirements:

   Not applicable

I. Device Description:

The Multi-Use Electronic Pregnancy Test is composed of two dye conjugates consisting of latex and colloidal gold particles, each labeled to a mouse anti-hCG monoclonal antibody, and an electronics board. The result indicator is a light emitting diode (LED). The electronics board serves as a reader for multiple tests. The new device contains a reactant strip and a separate component that houses the battery and contacts to activate the reader. The test kit contains 2 disposable test cartridges, 1 reader and 1 instruction pamphlet.

J. Substantial Equivalence Information:

1. Predicate device name(s):

   Mizuho USA, Inc. Proof Positive Electronic Pregnancy Test

2. Predicate 510(k) number(s):

   k043241

3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Specimen	Urine	Same
Reaction time	3 minutes	Same
Sample Collection	In stream sampling	Same

Differences		
Item	Device	Predicate
Electronics	LED display	LCD display
Test Stick	Contains the reagents and sample wick, battery and a separate reader unit,	Contains reagents and sample wick.
Test Kit Contents	2 disposable cartridges, 1 reader unit and instruction pamphlet	1 disposable cartridge and instruction pamphlet

K. Standard/Guidance Document Referenced (if applicable):

CLSI EP 12-A: User Protocol for Evaluation of Qualitative Test Performance

Guidance for FDA Reviewers and Industry Guidance for the Content of Premarket Submissions for Software Contained in Medical Devices, May 11, 2005.

L. Test Principle:

The Multi-Use Electronic Pregnancy Test is a solid phase dye-conjugate lateral flow immunoassay that utilizes an antibody conjugated to latex particles and an antibody labeled with colloidal gold particles. The urine specimen is absorbed through an absorbent strip and flows up to the reactive area where the conjugate dyed particles are located. When the urine enters the reactive area, the hCG antigen present in the urine binds to the labeled antibody dye conjugate, which forms an antibody-antigen-antibody complex. This results in the production of a red or green band, depending on the level of hCG. The electronic reader measures the reflectance at the test band to report the result as positive or negative.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

A study was conducted to evaluate the ability of the reader to perform multiple tests. A negative urine pool and 50 mIU/mL hCG spiked into negative urine pool was prepared. Each concentration was tested 50 times on the same reader. The samples were all negative at 0 mIU/mL and all positive at 50 mIU/mL hCG. The sponsor will provide only 2 tests per reader in the marketed version of the device.

See also (d) detection limit.

b. Linearity/assay reportable range:

Not applicable

c. Traceability, Stability, Expected values (controls, calibrators, or methods):

The assay was standardized using the WHO 4th International Standard (IS) for Chorionic Gonadotropin (75/589).

d. Detection limit:

An hCG-negative urine pool was spiked with hCG (WHO 4th IS) at concentrations of 0, 20, 25, 35, 40, 45, 50, 55, 60, 65, 70, 75, and 80 mIU/mL. Each concentration was tested 20 times. All the samples were negative at the 0 and 20 mIU/mL concentrations. 60% of the samples were positive (12/20) at 25 mIU/mL concentration. All the samples were positive at the 35, 40, 45, 50, 55, 60, 65, 70, 75, and 80 mIU/mL concentrations.

e. Analytical specificity:

Luteinizing hormone (1000 mIU/mL, WHO 2nd IS), follicle stimulating hormone (1000 mIU/ml, WHO 1st IS) and thyroid stimulating hormone (1000 µIU/mL, WHO 3rd IS) were added to hCG negative samples. An hCG-negative urine pool was used to prepare the samples. Two tests were performed for each hormone. Each hormone spiked into hCG negative urine produced negative results.

Common prescription and OTC drugs, as well as hemoglobin, protein, bilirubin and glucose were tested with the device at specified concentrations. The substances were spiked into negative urine pools containing either 0 mIU/mL hCG or 50 mIU/mL hCG. Each interfering substance, with and without hCG was tested once with the device. None of the substances caused interference. The table below lists the substances and concentrations that were tested for this study.

Substance	Concentration	Substance	Concentration
Acetaminophen	20 mg/dL	Gentisic Acid	20 mg/dL
Acetylsalicylic Acid	20 mg/dL	Glucose	2 g/dL
Albumin	300 mg/dL	Hemoglobin	500 mg/dL
Ascorbic Acid	100 mg/dL	Ibuprofen	20 mg/dL
Bilirubin	30 mg/dL	Phenothiazine	20 mg/dL
Estriol	1.4 mg/dL	Protein	2000 mg/dL
B-Hydroxybutyrate	2000 mg/dL	Caffeine	20 mg/dL
Ampicillin	20 mg/dL	Ethanol	1.0%
Acetoacetic Acid	2000 mg/dL	Tetracycline	20 mg/dL
Salicylic Acid	20 mg/dL	Atropine	20 mg/dL
Pregnandiol	2 mg/dL	Methanol	10%

The effects of varying pH levels (5 and 9) on test results were evaluated. The urine pools at each pH, with and without hCG were tested once with the device. The results obtained on samples spiked with 50 mIU/mL hCG were all positive and the results obtained on samples without hCG were all negative.

f. Assay cut-off:

See (d) Detection limit**.**

2. Comparison studies:

a. Method comparison with predicate device:

Urine specimens (n=150) were obtained at a clinic from women suspecting pregnancy. Specimens were randomly collected at different times of the day. The specimens were tested by a laboratory professional using the Multi-Use Electronic pregnancy test and the predicate device. There was 100% agreement between the methods.

b. Matrix comparison:

Not applicable

3. Clinical studies:

a. Clinical Sensitivity:

Not applicable

*b. Clinical specificity**:***

Not applicable

c. Other clinical supportive data (when a. and b. are not applicable):

Consumer studies were performed to determine if the device could successfully be used by a lay person using only the written instructions that were provided. The 150 women described in section 2(a) were asked to perform the Multi-Use Electronic Pregnancy Test and the results were compared to the results obtained by a laboratory professional. There was 100% agreement between the untrained user and the laboratory professional results.

The lay users ranged in age from 14 -54 years of age. Sixty eight (68) of 150 lay users provided their education information (5^{th} grade to graduate school) and their level of proficiency in the English language (English was the native language for 36/68 lay users and English was the second language for 32/68 lay users).

The study participants completed a questionnaire to gauge the readability of the written instructions. All participants indicated a) the test was easy to read and understand, b) the instructions were easy to follow and c) the illustrations and Question and Answers section in the instructions were helpful in performing and understanding the test.

4. Clinical cut-off**:**

   Not applicable

5. Expected values/Reference range:

   The expected values are based on literature. Healthy males and non-pregnant females should not have detectable hCG in urine by this method.

N. Instrument Name:

Mizuho USA, Inc. Multi-Use Electronic Pregnancy Test

O. System Descriptions:

1. Modes of Operation:

   Two step: user inserts the disposable cartridge into the reader, waits for green light to appear indicating the test is ready to be performed and applies the urine onto the wick.

2. Software:

   FDA has reviewed applicant's Hazard Analysis and software development processes for this line of product types:

   Yes _X_____ or No _____

3. Specimen Identification:

   No patient ID entry. Samples are assayed one at a time

4. Specimen Sampling and Handling:

   User inserts the disposable cartridge into reader and waits for the green light to appear indicating the test is ready to be performed. The user has 10 minutes to apply the urine onto the wick. If the urine is not detected within 10 minutes of this activation, the battery in the cartridge will degrade and an Invalid readout will occur. The user is instructed to perform a new test using a new disposable

cartridge.

5. Calibration:

   Factory set

6. Quality Control:

   The device has an internal process control which indicates that an adequate volume of sample has been added, that the strip is intact and that wicking has occurred.

   The reader will give an Invalid result under the following conditions:

   - If the user applies an insufficient or excessive amount of urine,
   - If the test is not performed within 10 minutes and battery decay occurs, and
   - If the test device is dropped and/or disassembled.

P. Other Supportive Instrument Performance Characteristics Data Not Covered In The "Performance Characteristics" Section above:

Not applicable

Q. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

R. Conclusion:

The submitted information in this premarket notification is complete and supports substantial equivalence decision.